INCH-POUND

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PERFORMANCE SPECIFICATION SHEET

ELECTRON TUBE, CATHODE RAY

TYPES 7YP1, 7YP2, AND 7YP7

This specification is approved for use by all Departments and Agencies of the Department of Defense.

The requirements for acquiring the electron tube described herein shall consist of this document and the latest issue of MIL-PRF-1.

DESCRIPTION: Electrostatic deflection and focus, square face, five beam.

DIMENSIONS AND PIN CONNECTIONS: See figure 1.

ABSOLUTE RATINGS:

Parameter:	Ef	Ec1	Eb1	Eb2	Eb3	ed	Rg	Zd	Ehk	Eb3/Eb2
Unit:	V	V dc	V dc	V dc	V dc	v	Meg	Meg	V dc	Ratio
Maximum:	6.9	-200	1,650	3,850	7,700	1,250	1.5	1.0 see note 1	±180	2.0 see note 2
Minimum:	5.7	0	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
Test conditions: see note 3	6.3	Adjust focus		2,000	4,000	- - -	- - -	1.0	- - -	2.0

GENERAL:

Qualification - Required.

Prior to shipment, 7YP2 tubes shall be electrically burned-in on a 100 percent basis. These tubes shall be operated at standard operating conditions with 5 microamperes direct current applied to each gun for a period of 48 hours. During this 48 hour period, the tube shall be turned off for 30 minutes (allowed to cool) and then turned on to continue burn-in at least 4 times. Following burn-in, each tube shall be tested in accordance with the following MIL-STD-1311 tests:

Method	Test	Method	Test
5201	Voltage breakdown	5241	Grid-cutoff voltage
5206	Gas “cross”	5251	Grid No. 1 leakage current
5223	Modulation	5251	Anode No. 2 leakage current
5231	Spot displacement (leakage)	5201	Electrode current (Anode No. 1)

Those tubes which fail any of these tests shall not be shipped.

Visual inspections shall be made to ensure that all JAN 7YP2 CRT’s are failure free from arcing for continuous and intermittent operational testing during all manufacturing and acceptance testing.

Pressure test method 1141 shall be performed, except 30 pounds per square inch (PSI) absolute pressure shall be applied in lieu of 45 PSI absolute, on a 100 percent basis prior to shipment for the JAN 7YP2 tube only. Only those tubes meeting the acceptance criteria for this test shall be shipped.

When a P2 CRT screen is specified, the phosphors shall be in compliance with Electronic Industries Alliance TEPAC Publication, TEP 116-B, ‘Optical Characteristics of Cathode Ray Tubes.’

TABLE I. Testing and inspection.

Inspection	Method MIL-STD-1311	Notes	Conditions	Symbol	Limits Min	Limits Max	Unit
Conformance inspection, part 1							
Voltage breakdown	5201	- - -		- - -	- - -	- - -	- - -
Voltage breakdown (electrostatic types)	5201	- - -		- - -	- - -	- - -	- - -
Gas “cross”	5206	6, 11	Ib3 = 50 µA dc	- - -	- - -	- - -	- - -
Bulb, screen and faceplate quality	5106	- - -		- - -	- - -	- - -	- - -
Light output	5221	11 11	P1 screen; Ib3 = 50 µA P2 screen; Ib3 = 50 µA, for 7YP2 only	Light Light	25 25	- - - - - -	ftL ftL
Modulation	5223	- - -	Ib3 = 50 µA dc	ΔEc1	- - -	55	V dc
Spot position (electrostatic deflection)	5231	8		- - -	- - -	16	mm
Spot displacement (leakage)	5231	- - -		- - -	- - -	10	mm
Grid cutoff voltage	5241	- - -		Ec0	-90	-50	V dc
Grid No. 1 leakage current	5251	- - -		Ic1	- - -	3	µA dc
Anode No. 2 leakage current	5251	- - -		Ib2	- - -	10	µA dc
Conformance inspection, part 2							
Screens	5221						
Type P2		11, 13		D1(1)	360	- - -	cB
Type P7		11, 13		D1(5)	400	- - -	cB
Type P7		11, 13		G5:1	4	- - -	cB
Heater current	1301	- - -		Ib	540	660	mA
Electrode current (anode No. 1)	5201	- - -		Ib1	-15	+10	µA dc
Electrode current (cathode)	5201	- - -	Ib3 = 50 µA dc	Ik	- - -	1,000	µA dc
Base alignment (electrostatic types)	5101	- - -	3D4; base key	- - -	- - -	- - -	- - -
Trace and bulb alignment (rectangular electrostatic types)	5101	- - -	1D2 trace and bulb wall with contact button	- - -	- - -	3	Degrees
Side terminal alignment (electrostatic types)	5101	- - -	3D4	- - -	- - -	- - -	- - -

See notes at end of table I.

TABLE I. Testing and inspection -Continued.

Inspection	Method MIL-STD-1311	Notes	Conditions	Symbol	Limits Min	Limits Max	Unit
Conformance inspection, part 2 - Continued							
Side terminal and base alignment	5101		Base key, collar index pin	- - -	- - -	- - -	- - -
Neck and base alignment (electrostatic types)	5101	- - -		- - -	- - -	- - -	- - -
Line width “A” (electrostatic deflection)	5226	- - -	Ib3 = 25 µA dc	Width	- - -	0.65	mm
Line width “B” (electrostatic deflection)	5226	7	Ib3 = 25 µA dc	Width	- - -	0.80	mm
Focusing voltage at Ib = 25 µA direct current	5246	- - -		Eb1	450	650	V dc
Deflection factor	5248	9	1D2	DF	68	80	V dc/in.
Deflection factor	5248	10	3D4	DF	27	37	V dc/in.
Heater-cathode leakage current	5251	- - -		Ihk	- - -	15	µA dc
Angle between traces	5101	- - -		- - -	88	92	Degrees
Trace alignment	- - -	12		- - -	- - -	- - -	- - -
Base pin solder depth	1111	- - -	Sample size shall be 1 percent of lot (lot = 1 month’s production)	- - -	- - -	0 failures	- - -
Secureness of base, cap or insert	1101	15		- - -	- - -	- - -	- - -
Permanence of marking	1105	- - -	For qualifications only.	- - -	- - -	- - -	- - -
Conformance inspection, part 3							
Life test	- - -	14	Group C; t = 500 hours; Ib3 = 25 µA dc	- - -	- - -	- - -	- - -
Life-test end points:	- - -						
Modulation	5223	- - -	Ib3 = 40 µA dc	ΔEc1	- - -	55	V dc
Line width “A”	5226	- - -	Ib3 = 18 µA dc	Width	- - -	0.65	mm
Line width “B”	5226	- - -	Ib3 = 18 µA dc	Width	- - -	0.80	mm
Pressure (implosion)	1141	5		- - -	- - -	- - -	- - -
Vibration	5111	5	For qualification only.	Width	- - -	1.0	mm

See notes at end of table I.

TABEL I. Testing and inspection -Continued.

Inspection	Method MIL-STD-1311	Notes	Conditions	Symbol	Limits Min	Limits Max	Unit
Conformance inspection, part 3 - Continued							
Direct-interelectrode capacitance	1331	4, 5	k to all	Ck	- - -	6.5	pF
			g1 to all	Cg1	- - -	7.0	pF
			D1 to D2	C1D2	- - -	2.7	pF
			D3 to D4	C3D4	- - -	3.2	pF
			D1 to all	CD1	- - -	8.1	pF
			D2 to all	CD2	- - -	8.0	pF
			D3 to all	CD3	- - -	7.8	pF
			D4 to all	CD4	- - -	7.8	pF
Neck and bulb alignment (electrostatic types)	5101	5		- - -	- - -	- - -	- - -
Stray light emission (conventional types)	5216	5	Eb2 = 3,850 V dc; Eb3 = 7,700 V dc	- - -	- - -	- - -	- - -
Cathode illumination	5216	5	For qualification only	- - -	- - -	- - -	- - -
Deflection-factor uniformity	5248	5	1D2	- - -	- - -	2	%
			3D4	- - -	- - -	5	%
Interaction factor	5250	5		- - -	- - -	$10x10^{-6}$	in./V dc
Shock	5115	5	For qualification only	- - -	- - -	- - -	- - -
Base material insulating quality	1216	5	For qualification only	- - -	- - -	- - -	- - -

NOTES:

1. The deflection electrode circuit resistance should be 1 MΩ or less and approximately equal, otherwise beam shift at high drives can be expected. Higher resistance values up to 5 MΩ may be used for low-beam current operation.
2. This tube is designed for optimum performance when operating at an Eb3/Eb2 ratio of 2.0. Operation at other ratios of Eb3/Eb2 may result in changes in deflection uniformity and pattern distortion.
3. All tests except direct-interelectrode capacitance, vibration and interaction factor, shall be made on each unit separately. Each deflection plate shall be connected to A2 through a resistance of 1 MΩ ± 10%.
4. All other electrodes contained within the envelope are to be tied together.
5. This test shall be performed during the initial production and once each succeeding 12-calender months in which there is production. A sampling plan shall be used, with sample of three tubes with an acceptance number of zero,. In the event of failure, the test will be made as a part of conformance inspection, part 2, with an Acceptance Level of 6.5 (see note 16). The regular “12 calendar month” sampling plan shall be reinstated after three consecutive samples have been accepted.
6. The pattern size shall be adjusted to 1.5 inches (38 mm) in the limited scan direction.
7. Due to limited scan of 3D4 plates, the length of scan in the 3D4 direction shall be limited to ±1 inch from the undeflected spot position. Line width “B” shall be measured at ± 0.75 inch (± 19.1 mm) from the undeflected spot position.
8. From the spot positions as indicated on figure 1.

TABLE I. Testing and inspection - Continued.

9. The deflection in this direction covers the minimum useful screen width following the bulb contour.

10. The deflection in this direction is limited to ± 0.75 inch (± 19.1 mm) minimum from the undeflected spot position.

11. This test to be performed at the conclusion of the holding period. This test applies only when P1 CRT screen phosphors are specified.

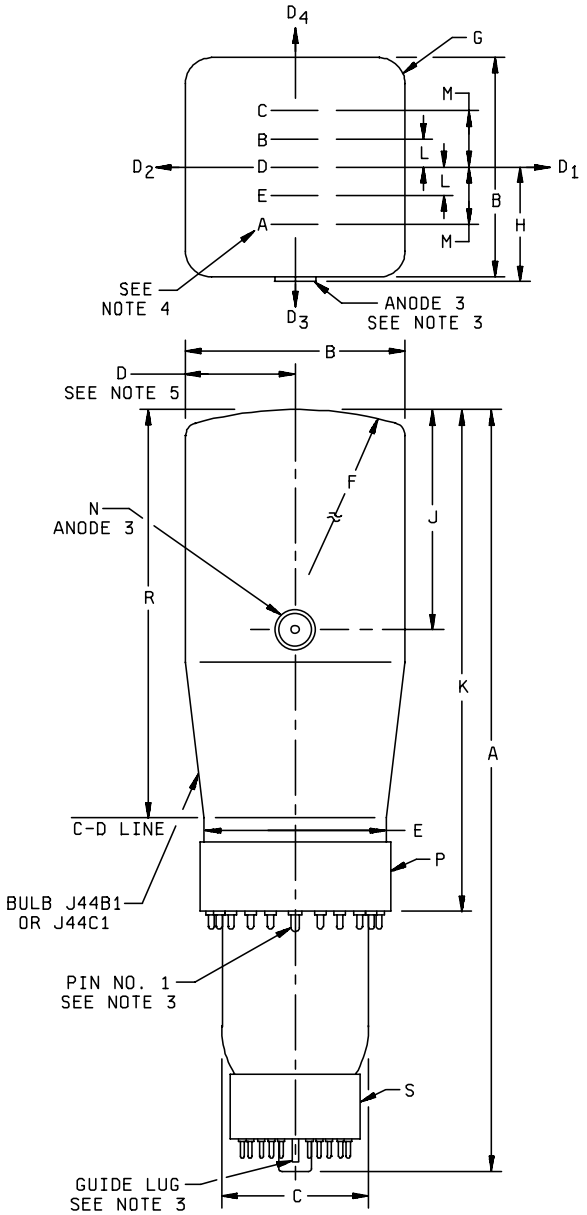
12. Corresponding traces of each unit are to be within 2 degrees of each other.

13. This test is not required unless specified in the purchase order or contract.

14. The tube manufacturer (7YP2 only) shall provide the user with two years of service life warranty commencing with shipment from the tube manufacturer. The second year of this warranty shall be pro-rated. Other terms and agreements regarding this warranty (i.e., pro-rating, handling of defectives) shall be negotiated at the time of purchase. The appropriate applicable documentation shall be provided by the tube manufacturer and this documentation shall accompany the tube. The user will be responsible for completing and returning the documentation to the manufacturer.

15. This test shall be performed on 100 percent basis and torque shall be 20 inch-pounds (7YP2 only). Immersion test for qualification only.

16. This specification sheet uses accept on zero defect sampling in accordance with MIL-PRF-1, table III.

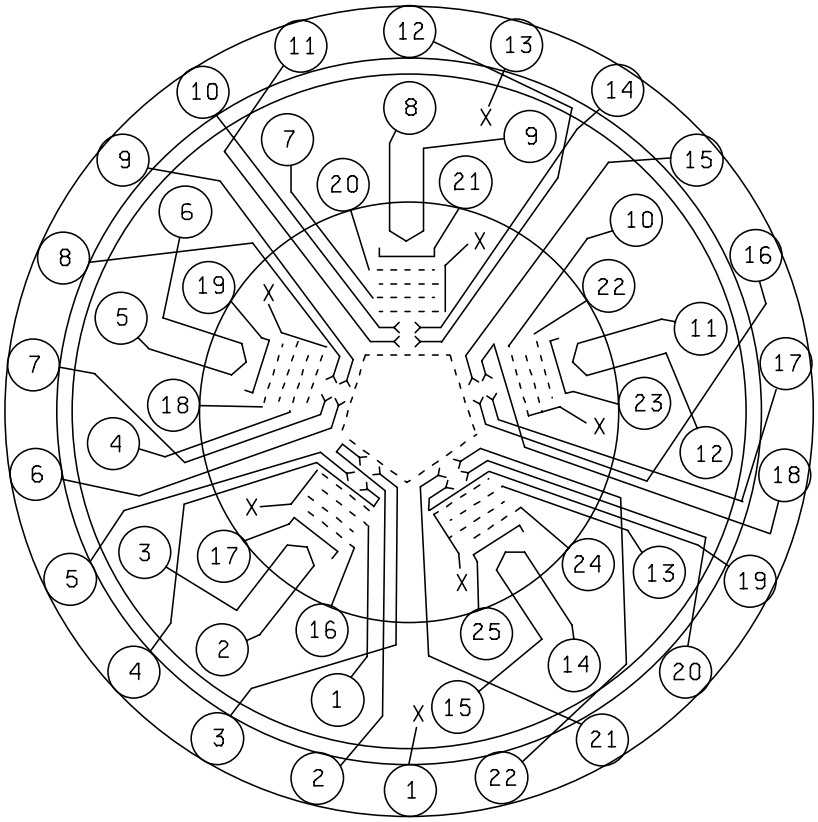


Dimensions in inches with metric equivalents (mm) in parentheses		
Ltr	Minimum	Maximum
Conformance inspection, part 2		
A	18.125 (460.38)	18.875 (479.42)
B	5.438 (138.13)	5.531 (140.49)
C	3.688 (93.68)	3.813 (96.85)
D	2.250 (57.15)	
E	4.344 (110.34)	4.468 (113.49)
H		2.797 (71.04)
J	5.125 (130.18)	5.375 (136.52)
K	12.125 (307.98)	12.375 (314.32)
Conformance inspection, part 3 (See note 5)		
N P S	Bulb contact: J1-22 Base, collar: A22-101 Base, B25-139 (See note 2)	
Reference dimensions (See note 1)		
F	40.00 (1016.0)	
G	0.75 (19.0)	
L	0.75 (19.0)	
M	1.50 (38.1)	
R	10.00 (254.0)	

NOTES:

1. These dimensions are for information and are not required for inspection purposes.
2. For pin alignment use JEDEC gage GB25-1.
3. Bulb contact J1-22, pin number 1 of base A22-101, and guide lug of base B25-139 shall each align with 3D4 trace within 10°.
4. Beam A shall center on position A as shown within 0.312 R. This requirement shall also apply to beams B, C, D, and E and their corresponding positions.
5. Useful screen radius.
6. Lancaster Glass bulb outline A-4314 or equivalent.

FIGURE 1. Outline drawing of electron tube types 7YP1, 7YP2 and 7YP7.



22 Pin collar base			25 Pin base		
Pin no.	Element	Beam	Pin no.	Element	Beam
1	Accelerator		1	Focusing electrode	A
2	Deflector D2	A	2	Heater	A
3	Deflector D1	A	3	Heater	A
4	Deflector D3	A	4	Focusing electrode	B
5	Deflector D4	A	5	Heater	B
6	Deflector D1	B	6	Heater	B
7	Deflector D3	B	7	Focusing electrode	C
8	Deflector D4	B	8	Heater	C
9	Deflector D2	B	9	Heater	C
10	Deflector D3	C	10	Focusing electrode	D
11	Deflector D1	C	11	Heater	D
12	Deflector D2	C	12	Heater	D
13	Accelerator		13	Focusing electrode	E
14	Deflector D4	C	14	Heater	E
15	Deflector D1	D	15	Heater	E
16	Deflector D2	D	16	Grid number 1	A
17	Deflector D4	D	17	Cathode	A
18	Deflector D3	D	18	Grid number 1	B
19	Deflector D4	E	19	Cathode	B
20	Deflector D3	E	20	Grid number 1	C
21	Deflector D2	E	21	Cathode	C
22	Deflector D1	E	22	Grid number 1	D
			23	Cathode	D
			24	Grid number 1	E
			25	Cathode	E

FIGURE 1. Outline drawing of electron tube types 7YP1, 7YP2 and 7YP7 - Continued.

NOTES

Referenced documents. In addition to MIL-PRF-1, this specification sheet sheet references MIL-STD-1311.

Changes from previous issue. The margins of this specification are marked with vertical lines to indicate where changes from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the previous issue.

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Navy - EC
Air Force - 11
DLA - CC

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DLA - CC

(Project 5960-3711)

Review activities:
Army - AV, CR4
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